EXHIBIT A
SCOPE OF WORK

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Acronym	Definition
Commission	California Energy Commission
CPA	California Power Authority
CPR	Critical Project Review
CPUC	California Public Utilities Commission
DER	Distributed Energy Resources refers to locally implemented demand or supply resources such as demand-side management, distributed generation (DG), real-time pricing, and other innovative demand-response programs. For the purposes of this study, DER will be implemented at the customer site, or interconnected with the local distribution utility system.
DG	Distributed generation refers to small-scale generating assets that are typically located near their intended use, and which generally connect at the primary or secondary distribution levels.
SF DoE	City and County of San Francisco Department of the Environment
ISO	California Independent System Operator
kWh	Kilowatt-hour, a unit of electricity energy
LIRP	Local integrated resource planning
PG&E	Pacific Gas & Electric
PIER	Public Interest Energy Research
SF Co-op	San Francisco Community Power Cooperative
SF PUC	San Francisco Public Utilities Commission
TAC	Technical Advisory Committee
T&D	Transmission and distribution

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2	X	Program Design and Analysis (Phase I)
3	X	DER Implementation (Phase II)
4		Performance Tracking and Reporting (Phase III)

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Steven Moss	Energy and Environmental Economics, Inc., and Electrotek Concepts, Inc.	SF Co-op
2	Steven Moss	Energy and Environmental Economics, Inc., and Electrotek Concepts, Inc.	PG&E and SF Co-op
3	Steven Moss	Energy and Environmental Economics, Inc., and Electrotek Concepts, Inc.	PG&E and SF Co-op
4	Steven Moss	Energy and Environmental Economics, Inc., and Electrotek Concepts, Inc.	PG&E and SF Co-op

Problem Statement

Over the past ten years, economists and engineers have conducted numerous case studies and analyses to determine the potential value of DER to generation, transmission, and distribution systems. However, these theoretical studies are of limited use to utilities, regulators and system planners. One of the key barriers to DER adoption has been that utilities remain unconvinced that DER provides significant benefits to their systems. Similarly, state regulators have not found DER sufficiently compelling to make changes to the utility incentive structure so that it is an attractive option for utilities to pursue. Nor has the California ISO fully incorporated DER into its reliability criteria -- a critical element if DER is to successfully play a role in the energy marketplace. The hypothesis of this research is that DER does have value to the traditional power system. This research project provides a "test bed" for *actual* DER implementations, supported by a rigorous analytical approach to examine the customer, social and system costs and benefits associated with an integrated approach to implementing energy efficiency, demand-response, and DG programs with dynamic pricing.[1] Using the SF Co-op for a real-world test of DER options directly assists the City and County of San Francisco and California in managing its energy infrastructure. It will also be useful to other communities, as well as to public and private utilities and energy regulators, who are considering distributed energy resources as a way to improve the efficiency and reliability of their electricity systems. Other states will also be interested in the practical results of this research, given that the number of actual DER implementations nationwide is extremely limited.[2]

The test bed area is already the site of a range of DER activities whose impact on the distribution system would not be known without this project. For example, in partnership with PG&E, SF Co-op is implementing a residential dynamic pricing research project in Bayview-

1 "Demand-response" refers to dynamic pricing programs that necessitate ongoing consumer response to be effective, such as interruptible or curtailment programs, and passive ones, such as real-time and time-of-use pricing.
2 For example, the New York Public Utility Commission has recently initiated a program whereby all utilities must issue Request for Proposals for distributed generation to test the potential of targeted distributed resources in transmission and distribution planning.

Hunters Point and Potrero. This first-in-the-state research effort will narrowly examine the demand elasticity associated with different price signals and other information provided to customers. However, demand-driven changes in energy use patterns could also have other important impacts, which will be uncovered through this effort. This is just one example of a number of synergistic activities that will enable this project to broadly leverage other resources.

Approach

This research project will measure and analyze changes to a local distribution system by leveraging community, local, state, and private DER programs into the study area. To accomplish the objectives and goals of this project, the Contractor will perform the following activities:

- The Contractor will work with PG&E to establish baseline characteristics of the study area feeders.
- The Contractor will identify the location of significant clusters of customers willing to implement DER technologies on PG&E's electricity distribution system. The Contractor will then select certain distribution feeders for monitoring and data collection where an effect can be 'seen'. PG&E and Electrotek Concepts, Inc. have estimated that approximately 5% to 10% of the feeder capacity meets the threshold of effective DER capacity needed to measure and validate the hypothesis of this project.
- The Contractor will act as a broker, coordinator and facilitator with the CPUC, PG&E, City and County of San Francisco, CPA, the Commission and their respective programs. Together, they will bring to bear their resources and incentives to create a test bed where sufficient amounts of DER can be implemented such that the hypothesis can be tested.
- The Contractor will work with customers on those feeders to obtain incentives from the external programs (e.g., CPUC, City and County of San Francisco, CPA, etc.) and have the DER technologies installed if they have not already been installed.
- The Contractor will issue price signals to residential participants in the CPUC's Dynamic Pricing Program in accordance to that program's rate structure and guidelines as established by the CPUC. In addition, the Contractor will work to implement demand-response programs focusing on businesses.
- The Contractor will monitor the effect of the price signals and installed DER technologies on the targeted distribution feeders.

Based on the above activities and relying on the feeder data, the Contractor will prepare an analysis of whether this DER can have a significant and positive impact on a local distribution system.

Overall Project Goals

The overall goal of this project is to evaluate the "real world" potential for DER with actual installations. This research will include an investigation of the costs, benefits and cost-effectiveness of DER options to customers, utilities and society, as well as the technical issues uncovered during the process. The results will be reported appropriately for a number of

audiences, including utilities, governments, energy consumers and other stakeholders interested in making informed decisions about DER programs.

For this project, the SF Co-op, California's first urban cooperative, will provide a unique platform from which to offer and implement innovative, energy-saving and shifting, and environmentally friendly DER technologies. With 1,100 residential and business members and growing, SF Co-op's customer base includes the Southeast San Francisco neighborhoods of Bayview, Hunters Point, Potrero Hill and adjacent neighborhoods (i.e. the Mission). SF Co-op serves a mixed land use, demographically diverse area with a transitional economy. This setting provides the opportunity to examine the implications of DERs for a full range of energy users (e.g., low to high income; multi-unit and single family residential; small to large commercial; industrial) with a variety of energy demand dynamics.

The electric system within the SF Co-op area includes two aging power plants (i.e., Hunters Point and Potrero); the potential for five new "peaker" or cogeneration facilities; and a number of existing and emerging DG units (e.g., diesel back-up; the largest privately financed solar installation in the City; cogeneration at Mission Bay and elsewhere). This setting includes all of the key components of an electric system – generation, transmission, and distribution – and provides for a rich environment in which to investigate DER and related issues.

Given that San Francisco is a transmission congested "island" with severe reliability challenges, the findings that emerge from this study are both topical and likely to have a wide impact on future DER implementations.

This project meets or exceeds all of the following PIER program goals:

- Improving the reliability, quality and sufficiency of California's electricity by objectively assessing the costs and benefits of DER initiatives to relieve congestion on the San Francisco transmission and distribution network.
- Improving the energy cost/value of California's electricity by identifying and testing DG solutions that can help to lower peak demand and minimize the need for new investments in transmission, distribution, and generation facilities.
- Improving the environmental, public health, and safety of California's electricity by encouraging energy conservation, demand response, and the appropriate development of low-impact, environmentally friendly, DG facilities.

Technical and Economic Performance Objectives

The specific objectives of this project are listed below and are followed by the individual task descriptions to be completed as part of this project.

1. Develop a baseline profile of feeders within the study area. Compile additional information on class- and area-specific load patterns, distribution-level demand, and distribution investment plans. ***Performance Objective:*** A written profile which describes the local area's baseline characteristics, including the variables identified above.

2. Inventory existing DER technologies already implemented in study area. Identify additional suitable DER program and technology alternatives. These will include a dynamic pricing tariff targeting residential customers; public and private sector investments in distributed generation; energy efficiency investments by PG&E, the City and County of San Francisco, and SF Co-op; and demand-response programs targeting businesses. ***Performance Objective:*** A report identifying and describing DER programs and alternatives in place or available to the study areas.
3. Facilitate adoption of selected DER technologies and programs to SF Co-op members and record the load profile impacts from implementing the technologies at customer sites and on PG&E's distribution system. Initial estimates are that approximately 5% to 10% of the feeder capacity meets the threshold of effective DER needed to validate the project's hypothesis. This threshold will be refined based upon baseline activities at the beginning of the project. ***Performance Objective:*** Secure sufficient penetration of DER technologies to record an impact on the local distribution system.
4. Evaluate the real economic and technical performance of the selected DER programs based on data from monitoring efforts. ***Performance Objective:*** Provide a comprehensive evaluation of economic and technical DER performance.
5. Quantify the dependability of load reduction and reliability improvements for each technology and program and cost/benefit of DER to various key stakeholders. ***Performance Objective:*** Quantification of impacts and costs/benefits by technology or program and to the local area distribution system.
6. Perform case study evaluation that demonstrates the ability of DER technologies and programs to meet ISO and utility reliability criteria. The case study evaluation will compare the cost-effectiveness of DER to traditional wire solutions. ***Performance Objective:*** Develop a comprehensive, useful case study evaluation report that will provide the basis for effective DER adoption by decision and policy makers.

TASK 1: PROJECT ADMINISTRATION TASKS

TASK 1.0 ADMINISTRATION

MEETINGS

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Contractor shall:

Attend a "kick-off" meeting with the Commission Contract Manager, the Contracts Officer, and a representative of the Accounting Office. The Contractor shall bring their Project Manager, Contracts Officer, Accounting Officer, and others designated by the Commission Contract Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Contract Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Terms and conditions of the Agreement
- CPRs (Task 1.2)
- Match fund documentation (Task 1.7)
- Permit documentation (Task 1.8)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Contract Manager's expectations for accomplishing tasks described in the Scope of Work;
- An updated Schedule of Deliverables
- An updated Gantt chart
- Progress Reports (Task 1.4)
- Technical Deliverables (Task 1.5)
- Final Report (Task 1.6)
- Establish the TAC (Task 1.10)
- TAC Meetings (Task 1.11)

The Commission Contract Manager shall designate the date and location of this meeting.

Deliverables:

- An Updated Schedule of Deliverables
- An Updated Gantt Chart
- An Updated List of Match Funds
- An Updated List of Permits
- Schedule for Recruiting TAC Members

Task 1.2 CPR Meetings

The goal of this task is to determine if the project should continue to receive Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, deliverables, schedule or budget.

CPRs provide the opportunity for frank discussions between the Commission and the Contractor. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Contract Manager and as shown in the Technical Task List above and in the Schedule of Deliverables. However, the Commission Contract Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Contractor.

Participants include the Commission Contract Manager and the Contractor, and may include the Commission Contracts Officer, the PIER Program Team Lead, other Commission staff and Management as well as other individuals selected by the Commission Contract Manager to provide support to the Commission.

The Commission Contract Manager shall:

- Determine the location, date and time of each CPR meeting with the Contractor. These meetings generally take place at the Commission, but they may take place at another location.

- Send the Contractor the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.

- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.

- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks. If the Commission Contract Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Commission's Research, Development and Demonstration Policy Committee for its concurrence.

- Provide the Contractor with a written determination in accordance with the schedule. The written response may include a requirement for the Contractor to revise one or more deliverable(s) that were included in the CPR.

The Contractor shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other deliverables identified in this Scope of Work. Submit these documents to the Commission Contract Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.

- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Contractor Deliverables:
- CPR Report(s)
- CPR deliverables identified in the Scope of Work

Commission Contract Manager Deliverables:
- Agenda and a List of Expected Participants
- Schedule for Written Determination
- Written Determination

Task 1.3 Final Meeting
The goal of this task is to closeout this Agreement.

The Contractor shall:
- Meet with the Commission to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Contractor, the Commission Contracts Officer, and the Commission Contract Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Contract Manager.

The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Contract Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Contract Manager and the Contracts Officer about the following Agreement closeout items:

- What to do with any state-owned equipment (Options)
- Need to file UCC.1 form re: Commission's interest in patented technology
- Commission's request for specific "generated" data (not already provided in Agreement deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential deliverables
- Final invoicing and release of retention

- Prepare a schedule for completing the closeout activities for this Agreement.

Deliverables:
- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

REPORTING

Task 1.4 Monthly Progress Reports
The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement.

The Contractor shall:
- Prepare progress reports which summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Contract Manager within 5 working days after the end of the reporting period. Attachment A-1, Progress Report Format, provides the recommended specifications.

Deliverables:
- Monthly Progress Reports

Task 1.5 Test Plans, Technical Reports and Interim Deliverables
The goal of this task is to set forth the general requirements for submitting test plans, technical reports and other interim deliverables, unless described differently in the Technical Tasks.

The Contractor shall:
- Submit a draft of each deliverable listed in the Technical Tasks to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 5 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 2 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

Task 1.6 Final Report
The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work done under this Agreement. The Commission Contract Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. Attachment A-2, Final Report Format, provides the recommended specifications.

The Final Report shall be a public document. If the Contractor has obtained confidential status from the Commission and will be preparing a confidential version of the Final Report as well, the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report.

Task 1.6.1 Final Report Outline

The Contractor shall:
- Prepare a draft outline of the Final Report.

- Submit the draft outline of Final Report to the Commission Contract Manager for review and approval. The Commission Contract Manager will provide written comments back to the Contractor on the draft outline within 5 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final outline to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final outline within 2 working days of receipt.

Deliverables:
- Draft Outline of the Final Report
- Final Outline of the Final Report

Task 1.6.2 Final Report

The Contractor shall:
- Prepare the draft Final Report for this Agreement in accordance with the approved outline.

- Submit the draft Final Report to the Commission Contract Manager for review and comment. The Commission Contract Manager will provide written comments within 10 working days of receipt.

  Once agreement on the draft Final Report has been reached, the Commission Contract Manager shall forward the electronic version of this report to the PIER Technology Transfer Group for final editing. Once final editing is completed, the Commission Contract Manager shall provide written approval to the Contractor within 2 working days.

- Submit one bound copy of the Final Report with the final invoice.

Deliverables:
- Draft Final Report
- Final Report

MATCH FUNDS, PERMITS, AND ELECTRONIC FILE FORMAT

Task 1.7 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. While the PIER budget for this task will be zero dollars, the Contractor may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained before the Contractor can incur any costs for which the Contractor will request reimbursement.

The Contractor shall:
- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:

  1. If no match funds were part of the proposal that led to the Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter.

  2. If match funds were a part of the proposal that led to the Commission awarding this Agreement, then provide in the letter:

     - A list of the match funds that identifies the:
     - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.

     - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind

contribution is equipment or other tangible or real property, the Contractor shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.

- A copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.

- Discuss match funds and the implications to the Agreement if they are significantly reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.

- Provide the appropriate information to the Commission Contract Manager if during the course of the Agreement additional match funds are received.

- Notify the Commission Contract Manager within 5 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Deliverables:
- A letter regarding Match Funds or stating that no Match Funds are provided
- Letter(s) for New Match Funds
- A copy of each Match Fund commitment letter
- Letter that Match Funds were Reduced (if applicable)

Task 1.8 Identify and Obtain Required Permits
The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. While the PIER budget for this task will be zero dollars, the Contractor shall show match funds for this task. Permits must be identified in writing and obtained before the Contractor can incur any costs related to the use of the permits for which the Contractor will request reimbursement.

The Contractor shall:
- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:

  1. If there are no permits required at the start of this Agreement, then state such in the letter.

  2. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
     - A list of the permits that identifies the:
       - Type of permit

    - Name, address and telephone number of the permitting jurisdictions or lead agencies
  - Schedule the Contractor will follow in applying for and obtaining these permits

- The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting, and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the appropriate information on each permit and an updated schedule to the Commission Contract Manager.

- As permits are obtained, send a copy of each approved permit to the Commission Contract Manager.

- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Contract Manager within 5 working days. Either of these events may trigger an additional CPR.

Deliverables:
- A letter documenting the Permits or stating that no Permits are required
- Updated list of Permits as they change during the Term of the Agreement
- Updated schedule for acquiring Permits as it changes during the Term of the Agreement
- A copy of each approved Permit

Task 1.9 Electronic File Format
The goal of this task is to unify the formats of electronic data and documents provided to the Commission as contract deliverables. Another goal is to establish the computer platforms, operating systems and software that will be required to review and approve all software deliverables.

The Contractor shall:
- Deliver documents to the Commission Contract Manager in the following formats:
  - Data sets shall be in Microsoft (MS) Access or MS Excel file format.
  - PC-based text documents shall be in MS Word file format.
  - Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
  - Project management documents shall be in MS Project file format.

- Request exemptions to the electronic file format in writing at least 90 days before the deliverable is submitted.

Deliverables:
- A letter requesting exemption from the Electronic File Format (if applicable)

Task 1.10 Structure and Meetings of the Technical Advisory Committee

The goal of this task is to establish a TAC to review and provide technical input and perspective to research conducted under this project. The Contractor Project Manager and the Commission Contract Manager shall act as the co-chairs of this committee. Other TAC members shall consist of no less than three and no more than five, members from utilities, the San Francisco Public Utility Commission, the Commission, universities, and/or industry representatives or experts in the field. The exact composition of members may change as need warrants. The TAC Team will be responsible for reviewing interim products. If requested by the Contractor, TAC members will sign non-disclosure agreements, the terms of which shall be approved by the Commission Contract Manager. TAC meeting materials and minutes will be treated as interim products, available for Commission review, but not as deliverables. Members of the TAC serve at the discretion of the Commission Contract Manager.

The Contractor shall:

- Prepare a draft Potential TAC Member List. This list shall include, but not be limited to, the names, affiliations, and qualifications of at least five potential TAC members.
- Submit the draft Potential TAC Member List to the Commission Contract Manager for review and comment. Once agreement on the draft list has been reached, the final list shall be submitted to the Commission Contract Manager for written approval, which shall be provided within 10 working days of receipt.
- Contact potential TAC members, as approved by the Commission Contract Manager, and request their participation on the TAC Team.
- Prepare a draft Final TAC Member List based upon the individuals who have agreed to participate on the TAC Team
- Submit the draft Final TAC Member List to the Commission Contract Manager for review and comment. Once agreement on the draft list has been reached, the final list shall be submitted to the Commission Contract Manager for written approval, which shall be provided within 10 working days of receipt.
- Prepare draft Subsequent TAC Member Lists as needed. Should any or all of the TAC members leave, the Contractor shall submit lists of potential individuals to replace them to the Commission Contract Manager for written approval, the Contractor shall contact these individuals and request their participation on the TAC Team and then inform the Commission Contract Manager of their acceptance or denial.
- Submit the draft Subsequent TAC Member Lists to the Commission Contract Manager for review and comment. Once agreement on the draft list(s) has been reached, the final list(s) shall be submitted to the Commission Contract Manager for written approval, which shall be provided within 10 working days of receipt.
- Convene meetings of the TAC as directed by the Commission Contract Manager. Arrange for the time and location, prepare agenda packages and take and prepare minutes from each meeting. Distribute meeting minutes to the members of the TAC no later than 10 working days after each meeting.

Deliverables:

- Draft Potential TAC Member List
- Final Potential TAC Member List
- Draft Final TAC Member List
- Final TAC Member List
- Draft Subsequent TAC Member Lists(s)
- Final Subsequent TAC Member Lists(s)

Task 1.11 Conduct Technical Advisory Committee Meetings

The goal of this task is to lay out meeting schedules and agenda items, and write summaries for TAC meetings.

The Contractor shall:

- Discuss the TAC meeting schedule at the kick-off meeting. The number of face-to-face meetings and teleconferences and the location of TAC meetings shall be determined in consultation with the Commission Contract Manager. This draft schedule shall be presented to the TAC members during recruiting and finalized at the first TAC meeting.
- Organize and lead TAC meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the Commission Contract Manager.
- Prepare TAC meeting agenda(s) with back-up materials for agenda items.
- Prepare TAC meeting summaries, including recommended resolution of major TAC issues.

Deliverables:

- Draft TAC Meeting Schedule
- Final TAC Meeting Schedule
- TAC Meeting Agendas with Back-up Materials for Agenda Items
- Written TAC Meeting Summaries, Including Recommended Resolution of Major TAC Issues

TECHNICAL TASKS

Unless otherwise provided in the individual Task, the Contractor shall prepare all deliverables in accordance with the requirements in Task 1.5.

Task 2: Program Design and Analysis (Phase I)

Task 2.1: Review of Area Characteristics and Needs

The goal of this task is to collect detailed baseline information on the target areas, which include the Hunters Point and Potrero Hill neighborhoods and relevant neighboring geographic areas. These data will include mapping of significant energy users and customer types; customer load information; area load profile and capacity requirements; anticipated power plant construction and upgrade schedules; transmission and distribution capacity upgrade and investment plans; residential and business attitudes and behaviors related to electricity use; and environmental and economic data. A rich supply of information already exists about this area because it is the focus of study by the Commission (e.g., as part of the Mirant power plant siting application for certification at the Commission), the City and County of San Francisco, PG&E, and the ISO.

Completion of this task meets the objective of providing baseline data for pairing DER technologies with customers and quantifying the impacts of the DER programs on the electrical system and usage characteristics.

The Contractor shall:

- Collect transmission and distribution information for the target areas. This includes working with PG&E to obtain the best available information for the area, including load forecasts and energy use profiles. Subject to the terms of the Contractor's agreement with PG&E to support this project, PG&E will provide to the Contractor: (a) data from the specific distribution feeders that can most easily accommodate and from which the greatest value would be derived from additional DER; (b) information on substation feeder load characteristics; and (c) details on potential future distribution upgrade costs and timing.
- Facilitate a technical 'kick-off' meeting with PG&E, the Commission, and other partners to reintroduce the project to the team.
- Prepare a Technical Kick-off Meeting Agenda.
- Prepare a Data Collection Plan around available sources of information, and assign specific roles in the data collection process.
- Gather information on customer type, energy usage, demand profile and contact details for the SF Co-op customer base.[3] This will be used to determine those energy users who can most benefit from DER adoption.
- Use the data set to develop an estimate of the T&D value of load reduction in the area, as well as to establish target load reduction goals for the project. In addition, the load data

3 The SF Co-op currently has approximately 1,100 members, including 500 small and large businesses and non-profit organizations.

will be instrumental in determining the timing and predictability of peak loads, which is essential to proper program design.

- Prepare a Report on the T&D Value of Load Reduction. This report shall include, but not be limited to, a discussion of the potential for DG connected to the feeder to defer future T&D investments in capacity (if any), value of the deferral, and other benefits DG can provide to the system.
- Prepare a Report on the Timing and Predictability of Peak Loads in the Target Area. This report shall include, but not be limited to, a discussion of the feeder load shape at different times of the day and different seasons, an analysis of how many hours of the year DER would be required to reduce peak loads, the predictability of the load pattern, and an estimate of whether DER of different sizes will be discernable in the total feeder load.
- Prepare a Report on SF Co-op Customers that could Benefit Most from DER Adoption. This report shall include, but not be limited to, an inventory of the types and sizes of the customers in the area and their major end-uses.

Deliverables:

- Draft Technical Kick-off Meeting Agenda
- Final Technical Kick-off Meeting Agenda
- Draft Data Collection Plan
- Final Data Collection Plan
- Draft Report on the T&D Value of Load Reduction
- Final Report on the T&D value of Load Reduction
- Draft Report on the Timing and Predictability of Peak Loads in the Target Area
- Final Report on the Timing and Predictability of Peak Loads in the Target Area
- Draft Report on SF Co-op Customers that could Benefit Most from DER Adoption
- Final Report on SF Co-op Customers that could Benefit Most from DER Adoption

Task 2.2: Review of Appropriate Technologies, Approaches and Subsidies

The goal of task 2.2 is to evaluate a range of distributed energy resource technologies and strategies that may be appropriate for use in the SF Co-op area and which are consistent with this project. Most of these technologies are being implemented through other state and local programs that will be identified. As discussed in task 2.1, this project will leverage those activities. An initial list of DER technologies includes:

<u>Demand-Side Options</u>

- Targeted efficiency measures[4]
- Locally dispatchable load curtailment, particularly through CPA, ISO, and utility programs
- "Smart" meters and programmable thermostats
- Real-time pricing, and other innovative demand-response programs
- Absorption cycle chillers

4 This is a well-trod area for which only limited additional analysis is expected (e.g., matching measures with area load characteristics as a means to maximize cost-effectiveness).

- Building energy management systems
- New building efficiency standards and design assistance

Local Supply-Side Options

- Natural gas-fired cogeneration (e.g., microturbines or larger)[5]
- Cogeneration with district heating and cooling
- Solar thermal and photovoltaics[6]
- Fuel cells
- Biodiesel-and biogas-fired generators
- Wind power

Successful completion of this task will be measured by the collection of detailed data on the various DER technologies and programs.

Meeting this goal will help to achieve the project's objectives by ensuring that all relevant DER options have been thoroughly researched before actual implementation commences, thereby increasing the chances of a successful outcome.

The Contractor shall:

- Conduct technology and subsidies baseline analysis. This shall include, but not be limited to, the following:
    - Collecting cost information on each DER technology and program. This shall include data on design and installation, metering, equipment, maintenance, useful life and available incentives to offset these costs.
    - Collecting demand-side performance information. This shall include a technology overview and data on potential demand and energy savings, dispatchability, customer acceptance, market penetration, time to install/implement, etc.
    - Collecting local generation performance information. This shall include a technology overview and data on rating, fuel type, efficiency, heat rate, emissions, reliability, time to install/implement, etc.
    - Identifying and collecting data on other complementary programs (e.g., SF DoE; SF PUC, CPUC, and the Commission), which are resulting in the adoption of DER technologies or approaches (e.g., energy efficiency measures; renewable DG). The inventory shall include who is managing and funding those programs, the program scopes and related information.
- Prepare, based in the information gathered in this task, a Technology and Subsidies Baseline Analysis.

Deliverables:

- Draft Technology and Subsidies Baseline Analysis
- Final Technology and Subsidies Baseline Analysis

5 Unless the Commission chooses to invest in this technology, the only co-generation anticipated to be implemented in the project area is by the University of California at its Mission Bay site, as well as potential city-sponsored investments as part of the potential Mirant expansion or new city-financed plants (e.g., at the sewage treatment facility).
6 Another well-analyzed technology for which the primary question will be whether it's a good match for the area.

Task 2.3: Cost/Benefit Analysis, Monitoring and Research Implementation Plan

The goal of task 2.3 is to develop a DER priority ranking and a research implementation plan. The ranking will be based on a combination of DER technology cost and performance matched with the community's needs as derived from baseline customer surveys conducted in task 2.1. The program will be designed to meet the area's peak load reduction goals, given the available budget and technology of collaborative partners, while testing a range of alternative DER technologies.

Prior experience has shown that there are several key parameters that can dramatically affect the benefits and costs of DER implementation in a given area. These include:

- Cost / benefit perspective being considered. The costs and benefits of a DER project can be dramatically different depending on which stakeholder perspective is taken -- the DER participant, the utility, non-participating ratepayers, or society-at-large. In this analysis, the Contractor will evaluate the costs and benefits from the perspectives of each stakeholder.
- Potential cost savings of the DER in the particular local area. Avoided costs can range from savings to the T&D system (e.g. expansion deferral), savings in wholesale power markets, reductions in power quality problems, reduced air emissions, and other benefits. Some of these benefits, such as the potential T&D savings, vary dramatically from area to area and must be analyzed on a case-specific basis.
- Cost of the DER technologies. This includes product purchase, installation, operation, and financing expenses.
- Willingness of customers to participate in the program.
- Incentives and program design, including the level and timing of incentive payments (CPA reduced loan, buy down incentives, etc.), and how accessible they are.

Successful completion of this task will be measured by the development of the Research Implementation Plan and a final determination if the overall project objectives for Phase 2 and 3 can be met.

Meeting this goal helps to achieve the project objectives by using the information gathered in tasks 2.1 and 2.2 to systematically prioritize and rank the various DER technologies and programs based on their benefits to SF Co-op customers.

The Contractor shall:

- Prepare a Preliminary Cost / Benefit Ranking Report. Given the costs of the different DER technologies and approaches, and their associated benefits, the Contractor will develop a Preliminary Cost / Benefit Ranking Report of technologies and approaches from each of the major stakeholder perspectives. This analysis will identify those technologies and approaches that can provide or come close to a "win-win-win" outcome for the participant, non-participants, utility and a broader social perspective. The analysis will also include an assessment of any necessary incentive payments or 'transfers' that could result in all stakeholders being better off. Costs and benefits will include, but not be limited to, benefit of reduced utility bills, avoided T&D upgrade costs, savings in

wholesale energy markets, ability of DER to meet reliability criteria (e.g., displace Reliability Must Run contracts), local economic benefits, community benefits (e.g., pollution and noise reduction), etc.

- Prepare a DER Penetration Potential Analysis. For those technologies that are cost-effective, or nearly cost-effective based on the analysis above and area characteristics, estimate the penetration potential of each DER technology or approach. This analysis will consider the area characteristics and the technology attributes and limitations to determine how successful a program or technology will likely be. In this step, the energy savings estimated from the cost-effective measure will be multiplied by both the number of customers that could adopt the technology or approach and the estimated penetration rate based on past performance of programs in the area. For example, an estimation of penetration potential for the installation of a new, efficient appliance could be: 0.2 kWh energy savings x 1,500 customers x 20% participation = 60 kWh potential savings.
- Develop Load Flow Circuit Model. Develop a load flow circuit model of the distribution feeders for the study. This model will be sufficiently robust to demonstrate that the implementation plan provides sufficient DER penetration to meet the goals of the project. To accomplish this, the circuit model will estimate the impact at the substation bank for end-use energy changes at different points on the feeder.
- Prepare a Monitoring Plan (to include load flow circuit model). The plan shall include, but not be limited to, collecting detailed load impact (hourly and/or 15-minute interval load information) and DER technology performance measurements at the customer sites. The plan shall also detail how data will be collected from utility meters at substation feeders. The plan shall describe the kind of data that will be collected (e.g., kWh, kW, load profiles, power quality, etc.). The plan shall confirm that neither switching nor other distribution system functions create a data or metering problem as a result of potential DER implementation. Customer site performance measures shall be collected from, but not limited to, the following sources:
    - PG&E Interval Metering. Each of the California utilities is investing in technology to install meters and provide real-time information on hourly or 15-minute interval usage for large customers. The goal of the PG&E Real Time Metering Program is to install this technology on all customers above 200kW by the end of 2003. Those customers who have the appropriate meters can view their usage data in real time on the Internet.[7]
    - Simple Data Logging. For smaller customers who do not receive interval meters, relatively simple data logging equipment, such as the Micro Data Logger product developed by Architectural Energy Corporation, can be used to evaluate DER performance.[8] These units store load information and are read manually at regular intervals.
    - Two-way Metering and Control. A third approach, which is a DER technology itself worth evaluating, is a two-way technology that can both record usage information and also send a signal to a building energy management system, smart thermostat, or other devices. This technology can help evaluate, measure and communicate to customers and the utility the potential system benefits arising from an integrated program of demand shifting, distributed generation and energy efficiency. Several vendors are

7 For more information see https://emeter.pge.com/pge/tutorial.html.
8 For more information see http://www.archenergy.com/mdl/default.htm.

seeking pilot projects to demonstrate this type of technology, and it may be possible to recruit a vendor to locate such a pilot in Southeast San Francisco.

- Prepare a Research Implementation Plan. With a completed economic and penetration analysis of each DER technology and approach, prepare the Research Implementation Plan. The plan shall include a target set of technologies and approaches that make the most sense for application in the Bayview/Hunter's Point / Potrero Hill area. The selection will be made based on cost-effectiveness, customer acceptance, and match with the area's needs. The plan shall identify the critical mass needed in order to have enough visible system impacts to test the hypothesis of this project. The plan shall include a description of how the critical mass was determined, what customer types to target, and strategies to recruit them.
- Determine Whether Expected DER Impact Exceeds Minimum Requirements. Based upon the information assembled throughout Phase 1, the Commission will decide at the completion of task 2.3 whether sufficient DER impacts can be measured for the successful completion of Phases 2 and 3. This decision will be based upon a threshold for potential impact established by the Contractor, Subcontractor, and the Commission.

Deliverables:

- Draft Preliminary Cost /Benefit Ranking Report
- Final Preliminary Cost /Benefit Ranking Report
- Draft DER Penetration Potential Analysis
- Final DER Penetration Potential Analysis
- Draft Monitoring Plan
- Final Monitoring Plan
- Draft Research Implementation Plan
- Final Research Implementation Plan

Task 2.4: TAC Meeting

The goal of task 2.4 is to hold a TAC Meeting to review the plans to date. Key questions will be posed to the TAC such as, but not limited to:

- Is it feasible that the critical mass target can be met with the subsidy program available?
- Is the monitoring plan and type of data to be collected sufficient enough to determine the feasibility of this approach?

The Contractor shall:

- Conduct a TAC meeting and prepare the deliverables described in task 1.11, Conduct Technical Advisory Committee Meetings.

Deliverables:

- Draft TAC Meeting Schedule
- Final TAC Meeting Schedule
- TAC Meeting Agendas with Back-up Materials for Agenda Items
- Written TAC Meeting Summaries, Including Recommended Resolution of Major TAC Issues

Task 2.5: 1st Critical Project Review

The goal of task 2.5 is to hold a CPR meeting.

The Contractor shall:

- Prepare the 1st CPR Report.
- Participate in the 1st CPR (as per the requirements in task 1.2).

Deliverable:

- 1st CPR Report.

Task 3: DER Implementation (Phase II)

Task 3.1: Participant Recruitment and Technology Implementation

The goal of task 3.1 is to launch targeted recruitment efforts aimed at generating interest and participation in DER programs from the SF Co-op customers and other residents and businesses in the study area. These programs include curtailment, real-time pricing, and DG technologies such as solar and micro-turbines. Because the Contractor's ongoing efforts principally consist of energy efficiency measures, additional recruitment resources will be needed to ensure adequate penetration of other DER identified in the Final Research Implementation Plan developed in task 2.3.

The SF Co-op maintains an active recruitment program (funded from non-Commission sources) for businesses and residents that will be leveraged for this project. This effort consists of two stages: enrolling new members into the SF Co-op (funded from non-Commission sources) and marketing appropriate DER technologies to facilitate their adoption (funded through this agreement). SF Co-op-sponsored recruitment activities will continue throughout the project period and will be further tailored to meet project goals (e.g., focus efforts on key customer types and technologies identified in the Final Research Implementation Plan developed in task 2.3).

Successful completion of this task will be measured by the recruitment of a critical mass of customers willing to test various DER initiatives, which is essential to achieving meaningful results from the implementation phase.

The Contractor shall:

- Recruit members to install particular technologies (e.g., PV installation, demand-response enabling technologies, efficiency measures, etc.).
- Ensure an adequate flow of information (see task 2.2) and provide assistance with gaining access to available leveraged programs and necessary financing since most options will require the customers to expend at least some of their own resources to participate in those programs and this project.
- Implement or track the adoption of some or all of the following DER programs. A monthly assessment of how these programs are building up to the critical mass shall be included in the Monthly Progress Reports.

- SF PUC, CPUC and Commission-sponsored renewable programs (e.g., solar; fuel cell; wind; micro-turbines);
- CPA, ISO and utility-sponsored demand-response (curtailment) programs;
- CPUC-sponsored residential dynamic pricing pilot program;
- Housing Conservation and Development Corporation energy efficiency programs (e.g., weatherization; furnaces);
- PG&E energy efficiency programs (e.g., weatherization; windows; water heaters; dishwashers; clothes washers; furnaces; air pumps; thermostats; insulation);
- Contractor – approximately $1 million in energy efficiency subsidies;
- SF DoE – $16 million in subsidized energy efficient programs, some of which is likely to be targeted in the study;
- San Francisco Water Department energy efficiency programs (e.g., clothes washers);
- U.S. Department of Energy efficiency programs (e.g., weatherization).

Deliverables:

- Status updates on DER recruitment shall be included in Monthly Progress Reports.

Task 3.2: Data Collection

Having established or expanded a variety of DER programs in the area, the goal of task 3.2 is to obtain performance data directly at the customer sites and at an aggregate level from utility meters at substation feeders to the extent it is available.[9] The customer data will provide information on the performance of individual DER technologies, while the aggregate load data will provide information on DER's overall impact.

Successful completion of this task will be measured by the creation of a "raw" data base of customer consumption and regional power flows.

The Contractor shall:

- Collect data in accordance with the Monitoring Plan and record data in the Customer Load Impacts Database. Monthly Progress Reports shall include a summary of the data collected.

Deliverables:

- Monthly summary of data collected shall be included in Monthly Progress Reports.

Task 3.3: TAC Meeting

The goal of task 3.3 is to hold a TAC Meeting to review analyses. Key questions will be proposed to the TAC such as, but not limited to:

- What will be the most useful and important information and data for protection engineers and regulators to consider validating the methodology and hypothesis of this project?

9 Contractor has preliminary indication from PG&E that utility feeder load data may be available.

The Contractor shall:

- Conduct a TAC meeting and prepare the deliverables described in Task 1.11, Conduct Technical Advisory Committee Meetings.

Deliverables:

- Draft TAC Meeting Schedule
- Final TAC Meeting Schedule
- TAC Meeting Agendas with Back-up Materials for Agenda Items
- Written TAC Meeting Summaries, Including Recommended Resolution of Major TAC Issues

Task 3.4: Critical Project Review

The goal of task 3.4 is to hold a 2nd CPR meeting.

The Contractor shall:

- Prepare the 2nd CPR Report.
- Participate in the 2nd CPR (as per the requirements in task 1.2).

Deliverable:

- 2nd CPR Report.

Task 4: Performance Tracking and Reporting (Phase III)

Task 4.1: Performance Tracking Review

The goal of task 4.1 is to assemble information from a range of sources, including the DER project schedules and budgets, customer feedback and load research, to provide the basis for the project analysis. The 'unprocessed' information contained in the interim reports developed in Phase 2 will be aggregated and refined to provide the most useful information.

The Contractor shall:

- Perform statistical analyses on load data to develop key information that is missing in most analyses of DER projects. This analysis shall be included in the Case Study Evaluation Report developed in task 4.2.
- Compare the results of the actual DER activities in the area to the expectations developed in task 2.3. This will provide insight into the methodology originally used to compute costs and benefits and design of the program. It will also provide researchers with a set of 'benchmarks' that can be extended to other DER projects. Evaluating the experience of DER from each stakeholder perspective will involve comparing the estimated versus actual factors in DER success, including:
  - Peak load reductions
  - Energy savings
  - Displacement of polluting generation sources
  - Transmission and distribution system benefits
  - Power quality improvement

- Losses reduction
- Customer bill savings
- Customer adoptions

- The analysis will also include factors that are a challenge to DER, including
  - Technical problems (interconnection, power quality issues, performance of DER measures)
  - Customer satisfaction and adoption issues
  - Program design problems
- Summarize conclusions about the engineering impacts of the distributed resources as illustrated by the metered results for the final report. These conclusions shall be included in the Case Study Evaluation Report developed in task 4.2.

Deliverables:
- Status updates on performance tracking shall be included in Monthly Progress Reports.

Task 4.2: Case Study Evaluation and Lessons Learned

The goal of this task is to prepare a report on the structure, activities, and analysis of the Bayview/Hunters Point/Potrero DER 'test bed' implementation. This will make the knowledge gained, experimental results and lessons learned available to researchers and decision-makers in industry, government and consumer groups. The report will communicate and identify ways in which the methodology developed in this study can be applied more broadly and developed further.

The Contractor shall:
- Prepare a Case Study Evaluation Report. In addition to analysis and conclusions from task 4.1 the report shall include, but not be limited to, the following:
  - Documentation program costs and impacts.
  - Description of the marketing results – what worked, what failed.
  - Description of technology performance.
  - Evaluation of the value of the expenditures (i.e., "bang for the buck").
  - Details on the cost / benefit analysis approach and method.
  - Assessment of the accuracy of the cost / benefit analysis
  - An inventory of programs that support DER implementation.
  - Identification of key regulatory issues and road blocks.
  - Identification of appropriate areas for targeted DER measures.
  - Explanation of the methodology for screening DER measures.
  - A review of the performance of DER technologies implemented in the study.

Deliverables:
- Draft Case Study Evaluation Report
- Final Case Study Evaluation Report

Task 4.3: Public Workshop

The goal of this task is to participate in a public workshop to convey the project's significant findings, lessons learned and applicability to other communities.

The Contractor shall:

- Prepare a Schedule and Agenda for a public workshop.
- Prepare Workshop Presentation. Materials shall reflect the findings of the research, lessons learned and the ability to replicate this methodology in other communities.
- Participate in a public workshop.
- Prepare Workshop Summary Report. The report shall describe feedback and comments received from participants in the workshop. It shall describe the implications of that feedback on the design of this project and feasibility of using this approach in other communities.

Deliverables:

- Draft Schedule and Agenda
- Final Schedule and Agenda
- Draft Workshop Presentation
- Final Workshop Presentation
- Draft Workshop Summary Report
- Final Workshop Summary Report